



396588

FIVE-YEAR REVIEW REPORT

Fourth Five-Year Review Report

for

LeHillier/Mankato Superfund Site

City of Mankato

Blue Earth County, Minnesota

June 2011

PREPARED BY:

**Minnesota Pollution Control Agency
St. Paul, Minnesota**


For the

**United States Environmental Protection Agency
Region V
Chicago, Illinois**

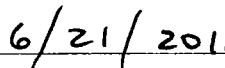
Review Number 1

Approved by:

Date:




Jeff Lewis
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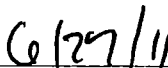


Approved by:

Date:



Richard C. Karl
Director, Superfund Division
United States Environmental Protection Agency, Region V



Five-Year Review Report

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List of Acronyms

AID	Acceptable Daily Tests
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
ESD	Explanation of Significant Differences to the ROD
FIT	Field Investigation Team
HRL	Health Risk Limit
HRS	Hazard Ranking System
HUD	Housing and Urban Development Agency
IC	Institutional Control
MCL	Maximum Contaminant Level
MERLA	Minnesota Environmental Liability and Response Act
MPCA	Minnesota Pollution Control Agency
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PLP	Permanent List of Priorities
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SWBCA	Special Well and Boring Construction Area
TBCs	To be Considered
TCE	Trichloroethylene
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

Executive Summary

The remedy for the LeHillier/Mankato Superfund (LeHillier) site (the site) located in Mankato, Minnesota, included pumping groundwater from multiple extraction wells to control the groundwater gradient and to reduce the mass of trichloroethylene (TCE) discharging to the Blue Earth River; groundwater treatment using a packed tower air stripping system; extension of the LeHillier community water supply system to the affected residents and businesses; the proper abandonment of the individual drinking water wells; and long-term monitoring of groundwater for volatile organic compounds (VOCs). The trigger for this five-year review was the completion date for the previous five-year review.

The operation of the groundwater extraction system began in September 1989. Groundwater extraction was performed at seven pump-out wells from 1989 through 1997. In November 1997, the groundwater extraction system was shut down and a monitoring program was initiated to evaluate the fate and transport of contamination under non-pumping conditions. Groundwater monitoring continues through the present. Private drinking water wells were abandoned and the community water supply system was extended to affected residences and businesses prior to construction of the groundwater extraction system.

TCE has been found to be the only contaminant of concern for the site. TCE degradation products, such as dichloroethenes or vinyl chloride, have not been detected in the groundwater samples. The monitoring data indicates the TCE concentrations have consistently been decreasing at each of the monitoring wells as compared to the historical concentrations. The TCE concentration was less than the laboratory reporting limit in 13 of the 16 monitoring wells sampled in June and in November 2010 (as compared to 11 of the 16 wells in May 2006). The TCE concentrations measured in the only three wells with detections show a decreasing trend. Among these three, monitoring well 4D remains the only well with a TCE concentration greater than the maximum contaminant level (MCL) (5 micrograms per liter), Minnesota health risk level (for drinking water – HRL 5 micrograms per liter), the target TCE concentration set in the Record of Decision (ROD) (2.8 micrograms per liter) and the new target TCE concentration set in the Explanation of Significant Differences (ESD) (5 micrograms per liter). The maximum detected TCE concentrations are also below the MPCA “Ground Water Screening Value for Vapor Intrusion Pathway (GW_{ISV}) for TCE (20 ug/l). Thus, vapor intrusion into residential homes in the plume area is not a concern.

The data indicates the TCE groundwater plume is significantly shrinking in areal extent and concentration, covering the limited area around the well 4D in the east central part of the site, near the Blue Earth River.

The remedy is functioning as intended and is protective of human health and the environment.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): LeHillier/Mankato		
EPA ID (from WasteLAN): MND980792469		
Region: 5	State: MN	City/County: City of Mankato/Blue Earth County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Construction completion date: September 1989
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input type="checkbox"/> EPA <input checked="" type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: Nile Fellows		
Author title: Project Manager		Author affiliation: MN Pollution Control Agency
Review period:** September 2010 through June 2011		
Date(s) of site inspection: November 16, 2010		
Type of review: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Non-NPL Remedial Action Site <input checked="" type="checkbox"/> NPL State/Tribe-lead </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Regional Discretion </div>		
Review number: <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input checked="" type="checkbox"/> Other (specify) Fourth		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____ </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Other (specify) </div>		
Triggering action date (from WasteLAN): September 27, 2006		
Due date (five years after triggering action date): September 27, 2011		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

None

Recommendations and Follow-up Actions:

None

Protectiveness Statement(s):

The remedy is functioning as intended and is protective of human health and the environment.

Other Comments: None

Date of last Regional review of Human Exposure Indicator (from WasteLAN): __8/30/2010__

Human Exposure Survey Status (from WasteLAN): Current Human Exposure Controlled and Protective
Remedy in Place

Date of last Regional review of Groundwater Migration Indicator (from WasteLAN): __8/11/2010__

Groundwater Migration Survey Status (from WasteLAN): Contaminated Groundwater Migration Under
Control

Five-Year Review Report

I. Introduction

The purpose of this five-year review is to determine whether the remedy at the LeHillier/Mankato Superfund (LeHillier) site is protective of human health and the environment. The methods, findings and conclusions of this review and previous reviews have been documented in five-year review reports. In addition, five-year review reports identified issues, if any, and recommendations to address them.

The Minnesota Pollution Control Agency (MPCA) as the lead agency for the site is preparing this five-year review report pursuant to CERCLA Section 121 and the National Contingency Plan (NCP). AECOM serving as a consultant to MPCA assisted in developing this review. CERCLA Section 121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to ensure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

This requirement is interpreted further in the NCP; 40 CFR Section 300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

The MPCA and EPA staff have completed a five-year review of the remedial action (RA) conducted at the LeHillier Superfund site in Mankato, Minnesota. This five-year review was conducted from September 2010 through June 2011 and focused on the protectiveness of the remedy at the LeHillier site twenty two years from the time the remedial action commenced. This is the fourth five-year review completed by the MPCA and it covers a period of time from October 2006 through June 2011. The first five-year review was completed on June 20, 1996, the second review was completed on September 27, 2001, and the third review was completed on September 27, 2006.

II. Site Chronology

Table 1: Chronology of site Events

Event	Date
MPCA began monitoring water quality in private wells.	10/1981
USEPA established a preliminary Field Investigation Team (FIT Study) of the site.	1982-1983
Site listed on the National Priorities List (NPL).	9/1983
Site listed on the Minnesota Permanent List of Priorities (PLP).	10/1984
Community water supply system was installed to supply potable water to affected residences and businesses.	1984
The Remedial Investigation report was completed.	9/27/1985
USEPA executed a Record of Decision (ROD).	9/1985
Remedial Design was completed.	6/1988
Groundwater extraction system became operational.	9/18/1989
Completion of the first five-year review.	6/20/1996
Groundwater extraction system was shut down.	11/1997
Ongoing groundwater monitoring.	1997-present
Completion of the second five-year review.	9/27/2001
Site was delisted from the Minnesota PLP.	11/21/2003
Completion of the third five-year review.	9/27/2006
USEPA and MPCA signed ESD to the ROD	8/24/2008

III. Background

Physical Characteristics

The LeHillier Superfund site is located in south central Minnesota, approximately 80 miles southwest of the Twin Cities. Site location and nearby features are shown on Figures 1 and 2. The northern part of the site is within the city of Mankato, which has a population of 36,500 (as of July 2009 – www.city-data.com/city/Mankato-Minnesota.html - 12.6% growth since 2000). This area is referred to as West Sibley Park or Land of Memories. The southern half of the site includes residential and industrial areas that are part of unincorporated LeHillier which is part of South Bend Township. The site is on properties just west of the Blue Earth River and just south of the Minnesota River.

Groundwater movement in the shallow aquifer beneath the site changes direction in response to precipitation, local aquifer use (City of Mankato municipal wells No. 13 and 15 – see Figure 2), and changing stages of the Blue Earth and Minnesota rivers. Depending on the river stage, the aquifer may be either recharged by the rivers or may be discharging water into the rivers.

Adjacent Land and Resource Use

The LeHillier site covers several square miles. The Chicago and Northwestern Railroad crosses the site at approximately its north-south midsection. LeHillier and West Sibley Park are situated in the floodplains of the Blue Earth and Minnesota Rivers. The area was susceptible to seasonal flooding before the construction of a flood control system by the U.S. Army Corps of Engineers (COE) in the mid-1970s.

Land of Memories Park in West Sibley Park includes soccer fields, park pavilions, a camp ground, a boat landing, and is also the location of three municipal wells for the city of Mankato. Municipal Well 13 (Well 13) is a Ranney Collector located near the northeast corner of the park. Municipal Well 14 (Well 14) is a deep well located southwest of Well 13. Municipal Well 15 (Well 15), constructed in 2005-2006, also as a Ranney Collector, is located in the northwest side of the park. These three municipal wells are providing approximately 80 percent of the total volume of water for the Mankato municipal water supply system.

A Ranney Collector is a radial collector well that extracts water via multiple horizontal pumping arms instead of through a single vertically-placed well. The pumping arms radiate out from a central pumping shaft. Typically, Ranney Collector wells are shallower than vertical water supply wells and are often constructed next to rivers or other surface water bodies. In some cases, one or more of the lateral extraction wells extend beneath the adjacent surface water body.

The newest municipal well at the site, Well 15, was constructed with four lateral well arms varying in length from 158 to 218 feet. None of the lateral arms extend beneath the River as a significant amount of silt and clay was encountered during the well construction immediately

adjacent to the river channel (see Figure 3). The lateral wells are approximately 39 feet below ground level (bgl).

Well 13 was constructed with eight lateral well arms that vary in length from 99 to 240 feet (see Figure 4). Four of the eight lateral arms extend beneath the Blue Earth River. The lateral wells are approximately 45 feet below ground level (bgl).

There are a total of six municipal wells that provide the water supply for the city of Mankato. The three remaining wells are located in other parts of the city and two of these wells are stand-by wells which are used during periods of high demand or when other wells are shut down for maintenance. Approximately 36,500 year-round residents in the city are served by the municipal water system. The population served by the municipal water supply system increases by about 10,000 people when the University of Mankato is in session.

South Bend Township constructed a well in 1984 to provide water to the Lehillier residents. The well completed in the Mt. Simon aquifer is 550 feet deep and is located about one mile northwest of the Lehillier site, between Highway 169 and the Minnesota River.

Another significant feature in the site area is the COE flood control system. The system was completed in 1977 and consists of pumping stations, an earthen levee that begins at the southern tip of the site and extends north along the Blue Earth River for approximately 2,000 feet, and a groundwater relief interceptor pipe. The pumping stations serve to prevent excessive recharge into aquifer from the river during periods of high stage and to accelerate groundwater movement toward the river during periods of high water table levels. This is done either by gravity flow or active pumping.

History of Contamination

The LeHillier area contained numerous natural and manmade depressions resulting from changes in the channels of the Minnesota and Blue Earth rivers and from excavation of sand and gravel. Between 1925 and 1960, these depressions were filled with miscellaneous rubbish. No records of the dumping or disposal activities or types of waste materials placed in these depressions were kept.

In the fall of 1981, the MPCA received information which alleged the disposal of hazardous wastes at several dumps or fill areas at the site. Subsequent investigations revealed halogenated volatile organic compound contamination of the shallow sand and gravel aquifer. 1,1,2-Trichloroethylene (TCE) was the primary contaminant detected throughout the area, although other contaminants periodically detected were: 1,1-dichloroethane; 1,2-dichloroethene; 1,1,1-trichloroethane; 1,1,2,2-tetrachloroethane; tetrachloroethene; bromodichloroethane; methylene chloride; and 1,1-dichloroethene. The highest concentration of TCE in a residential well was 300 micrograms per liter (ug/l) found in a home near monitoring well 4S.

In addition to TCE identified in groundwater, petroleum hydrocarbons (ethyl benzene at 18,000 micrograms per kilogram (ug/kg), toluene at 2,400 ug/kg and xylenes at 81,000 ug/kg) were identified in subsurface soils in a small area at the end of Eleanor Road and adjacent to the southern part of the COE levee. This area was identified as a location of former waste disposal. Historically, the highest concentrations of TCE were detected in groundwater in four general locations – just to the south of the railroad tracks (monitoring wells 4S, 4D, 5S, and 5D); just to the north of the railroad tracks (monitoring well 8S); in the southeast area of the site (monitoring wells 18S, W28 and W30 and pump-out well PW-7); and in the south-central area of the site (monitoring well W24). Locations of those wells are shown on Figure 8.

Efforts to locate a source(s) of the TCE contamination were unsuccessful. The TCE concentrations in the soil and septic system samples were low or below analytical method reporting limits. Since no specific sources of TCE were identified and no waste disposal records exist, no potentially responsible parties (PRPs) were identified.

Initial Response

In September of 1981, the Minnesota Department of Health (MDH) issued a health advisory affecting approximately 200 residents in LeHillier. The advisory recommended that those affected seek an alternative water supply for cooking and drinking. The MDH also established a Special Well Construction Area (SWCA) that limits new water well and monitoring construction at the site. The area covered is shown in <http://www.health.state.mn.us/divs/eh/wells/swca/lehillmap.html>. The SWCA is administered by Blue Earth County. The County also issues well permits.

During the fall of 1982 and the spring of 1983, U.S. Environmental Protection Agency (USEPA) conducted a preliminary investigation of the site. Based on the study, the site was given a Hazard Ranking System (HRS) score of 59.75 and was added to the National Priorities List (NPL).

A bottled water program was instituted by USEPA and was continued by the MPCA for residents of LeHillier whose well water contained TCE in concentrations greater than 25 ug/l. A Housing and Urban Development (HUD) grant for construction of an alternative groundwater supply well was sought and obtained by Blue Earth County on behalf of the LeHillier community. The water supply system was completed by the end of 1984. A sanitary sewer system was installed in 1987.

USEPA Remedial Investigation (RI) field activities took place between August 1984 and April 1985. The final RI report was completed on July 26, 1985. The RI activities documented the presence of an elongated 50-acre plume of TCE in the shallow unconfined aquifer (see Figure 5). This contamination is believed to be the result of uncontrolled dumping at multiple locations in the LeHillier area. The plume paralleled the Blue Earth River along the eastern half of the site with the highest TCE concentrations in the southern portion of the site. The leading edge of the plume was estimated to be 1/4-mile south of the city of Mankato's Well 13.

Basis for Taking Action

The hazardous substances detected in site's soils were TCE, ethylbenzene, toluene, and xylenes, and the primary contaminant of concern in groundwater at the site was TCE. The human health risk assessment completed for the site showed an unacceptable excess lifetime cancer risk of 7×10^{-4} for adults who ingested groundwater from the private wells located in LeHillier, with the majority of the risk being due to the potential ingestion of TCE in groundwater. To achieve an acceptable excess risk of 1×10^{-6} , the groundwater performance standard of 2.8 ug/l for TCE was established in the ROD.

An assessment of potential risks due to contamination in soil was also conducted as part of the site remedial investigation. Soil contamination was detected in two soil borings at depths between 24 and 34 feet below ground level. Because of the depth at which the contamination was found, the risk assessment concluded that exposure due to direct contact was unlikely; however, the route was evaluated nonetheless. Based on risk-related health values called "acceptable daily intakes" (ADIs), the risk assessment concluded that even in the event of direct ingestion of the soil, ADIs would not be exceeded and there would be no unacceptable health risks. In addition, a review of groundwater results showed that the presence of the ethylbenzene, toluene, and xylenes was limited to a few wells, and none of the compounds appeared in significant concentrations. In groundwater samples collected during the remedial investigation, the highest concentration of toluene observed was 6.3 ug/l (MCL is 1000 ug/l), the highest concentration of ethylbenzene was 12 ug/l (MCL 700 ug/l), and the highest concentration of xylene was 71 ug/l (10,000 ug/l).

Based on the results of the risk assessment, the presence of TCE in groundwater was determined to pose an unacceptable health risk, and a variety of cleanup actions to address the problem were evaluated.

IV. Remedial Actions

Remedy Selection

A Feasibility Study (FS) was completed on August 9, 1985 and the ROD was completed by USEPA on September 27, 1985. The recommended alternatives, as stated in the ROD, were the following:

1. Groundwater extraction in the area of highest contamination, treatment by air stripping, and discharge to Blue Earth River through the COE groundwater relief interceptor.
2. River recharge control by pumping existing groundwater relief wells which are part of the COE dike system.
3. Groundwater extraction at a blocking well located in West Sibley Park designed to intercept groundwater flowing north toward the Ranney Collector (the City of Mankato municipal wells 13).
4. Abandonment of domestic wells within the area.

The remedial action objectives (RAO) as put forth in the ROD were as follows:

- Adequately protect the public against exposure to TCE through direct contact or ingestion of groundwater from a private and public water supply.
- Adequately protect the public against exposure to TCE released to surface water from the groundwater.
- Adequately protect and minimize damage to the environment from the migration of TCE in the groundwater.
- Reduce the levels of TCE to less than 2.8 ug/l within a five to ten year time period.

All these remain the remedial action objectives for the site today, except that the TCE reduction goal of 2.8 ug/l has been changed to 5 ug/l, as documented in the Explanation of Significant Differences to the Record of Decision signed in August 2008 (USEPA / MPCA, August 2008 – Explanation of Significant Differences to the Record of Decision, LeHillier/Mankato Site, EPA ID: MND980792469, Mankato, MN) (ESD). The ESD also documents and explains the changes made to the remedial design as specified in the ROD. The changes made to the ROD that are included and documented in the ESD are summarized below:

- A system of seven extraction wells, rather than ten extraction wells was put in place.
- The groundwater pump-and-treat system was operated for 10 years. In 1997 the system was shut down, and in 2007 dismantled.
- The extension of the LeHillier community water system was completed by Blue Earth County using funds from a Housing and Urban Development grant.
- The TCE cleanup objective was changed from 2.8 ug/l to 5 ug/l.

- Although no institutional controls were required by the ROD, in 1987, South Bend Township voluntarily passed an ordinance prohibiting use of groundwater for drinking in the area of the plume. The Township is currently in the process of updating the ordinance (see discussion in the following sections).

ARAR Review

Applicable and Relevant and Appropriate Requirements (ARARs) (associated with the construction and long-term maintenance and monitoring of the remedial actions at the LeHillier Superfund site) were not addressed in the ROD. ARARs were not included in the ROD because the ROD was completed in September 1985, which was before the enactment of the Superfund Amendments and Reauthorization Act of 1986 (SARA). Prior to SARA, the Superfund statute did not require compliance with ARARs, but the NCP generally required that remedies meet federal environmental and public health laws and take into consideration federal and state environmental guidance documents (See 40 CFR 300.68, proposed February 12, 1985, adopted November 20, 1985, and effective February 18, 1986). SARA adopted similar requirements for remedies to comply with federal and more stringent state environmental laws that are applicable or relevant and appropriate.

Although not specifically required by the ROD for the LeHillier site, several requirements that have been referred to in the course of implementing the remedy are:

1. Safe Drinking Water Act (SDWA), 40 CFR Parts 141-146, which establishes an MCL of 5 ug/l for TCE. This standard applies to municipal drinking water supplies.
2. Minnesota Rules Chapter 7060, which establishes uses and non-degradation for groundwater.
3. Minnesota Rules Chapter 4725 (Water Well Code), which establishes requirements for well installation. Wells installed at the site have been constructed in accordance with the Minnesota water well code.
4. Minnesota Statute 103H, Ground Water Protection Act, which establishes health risk limits (HRLs) for groundwater contaminants. The HRL for TCE was originally set at 30 ug/L; the revised HRL is 5 ug/L. The remedial action performance standards for groundwater were established in the ROD based on a health risk assessment for ingestion of drinking water at a 10^{-6} excess lifetime cancer risk concentration of 2.8 ug/l.
5. Minnesota Rules Chapter 7050, Section 0220, which established the surface water quality standard for TCE for 2B class of waters of 120 ug/l.

The site-specific water quality remedial action objective of 2.8 ug/l set in the ROD is more stringent than the water quality criteria established in the ARARs listed above. Consequently, the ROD cleanup level of 2.8 ug/l was replaced with a revised cleanup level of 5 ug/l (USEPA/MPCA 2008).

Remedy Description and Implementation

Remedial Design (RD) began August 3, 1987, as an MPCA lead. The final design varied from the FS and ROD in that the COE groundwater relief system was not used to control river recharge. Instead, seven extraction wells, with discharge through the COE interceptor, were designed to replace the COE system. This change is explained and documented in the Explanation of Significant Differences to the Record of Decision (USEPA/MPCA, 2008).

The RD was completed in June 1988. Remedial Action (RA) construction began in September 1988, and the operation of the groundwater treatment system began on September 18, 1989.

The system consisted of a primary plume extraction well (PW-7), which discharged to a packed tower air stripper, a blocking well (PW-1), and five pump-out wells (PW-2 through PW-6) (Figure 6). The five pump-out wells were designed to control the westward migration of river recharge water. Uncontrolled recharge of the site's contaminated aquifer by the river during periods of high river stage would cause a significant dilution of the plume by the uncontaminated river water – this way the site's contaminants would be diluted by the river, instead of being recovered by the primary plume extraction well (PW-7). These five pump-out wells discharged into the COE interceptor, which, in turn, discharges into the Blue Earth River. Extraction well PW-7 pumped the most contaminated groundwater, which was treated by air stripping and, then, also discharged to the COE interceptor. The blocking well, PW-1, protected the Ranney Collector municipal water supply well (Well 13) and discharged directly to the Blue Earth River through an outfall. The remedial action also included the abandonment of 83 private wells. During the remedial activities, three cisterns were found and were subsequently cleaned and filled.

In November of 1997, the pump-out system was taken out of operation and a monitoring program was initiated to evaluate the fate and transport of contamination under non-pumping conditions. The system was shut down based on the achievement of the cleanup criterion of 2.8 ug/L (set in the ROD, later changed to 5 ug/l by ESD) for TCE in five of the six pump-out wells since April 1991, or earlier, and in the remaining pump-out well since June 1994. After almost 10 years of non-operation, in 2007 the pump-out system was dismantled leaving only PW-2. The shut-down and dismantlement are documented in the Explanation of Significant Differences to the Record of Decision (USEPA/MPCA, 2008).

During the 2007 removal and dismantlement of the system, ten locations at private residences were identified by Blue Earth County that may still have wells. Site inspections found five homes did not have wells and the other five were either vacant or would not respond.

Groundwater samples were collected periodically from select monitoring wells since the system was shut down in 1997. The most recent sampling was performed during November 2010. The groundwater samples are analyzed for volatile organic compounds (VOCs) listed under the applicable Minnesota Department of Health (MDH) method.

The MPCA delisted the LeHillier site from its PLP on November 21, 2003.

Institutional Controls

Institutional controls, or “ICs,” are generally required to ensure the protectiveness of remedies.

ICs are non-engineered instruments, such as administrative requirements, legal controls, and public information, that help to minimize the potential for exposure to contamination, and that protect the integrity of the remedy. ICs are required to assure long-term protectiveness for any areas of a site that do not allow for unlimited use or unrestricted exposure. ICs are generally consolidated into the following four categories:

1. Governmental controls (e.g. zoning, local ordinances);
2. Proprietary controls (declarations, easements, restrictive covenants);
3. Enforcement and permit tools (e.g. consent decrees, administrative orders); and
4. Informational tools (e.g., notices filed in the land records, advisories).

Decision Documents and Actions

The 1985 ROD for the LeHillier site did not provide for institutional controls as part of the remedy. ICs were eventually added to the remedy in the 2008 Explanation of Significant Differences (ESD) as described below.

In September of 1981, MDH sent an advisory to licensed well contractors working in the Mankato area. The area of the issued advisory is in parts of Sections 14 and 23, Township 108N, Range 27W, Blue Earth County, bounded by East Hawley Street on the west and the Blue Earth River on the east, north and south. The contractors were specifically told that residents with elevated levels of TCE had been advised to use alternate drinking water sources, and that the MDH was now advising that contaminated wells be deepened or that new deeper wells be constructed until the source, extent, nature and hydraulics of the contamination are known.

Also, in 1981, MDH established a Special Well and Boring Construction Area (SWBCA) that limits new water well and monitoring construction at the Site. The area covered is shown in <http://www.health.state.mn.us/divs/eh/wells/swca/lehillmap.html>. The SWBCA is administered by Blue Earth County. The County issues well permits, but the permit process also involves MDH – Well Management Section, who has a jurisdiction over issuance of well permits within the SWBCA.

In 1987, South Bend Township voluntarily passed an ordinance prohibiting the use of groundwater for drinking in the area of the plume. Currently, the Township is in the process of updating the ordinance. The updated ordinance will include a map of the restricted area, provisions about restrictions related to temporary dewatering during construction activities, and

prohibitions against tampering with site monitoring wells. The language and content of that proposed updated ordinance was provided to the Township in a 2007 letter sent by Mary Tierney of USEPA to Steve Flow, Clerk of South Bend Township. In addition, the Township will also enter into a Memorandum of Understanding with MPCA in which it will agree to alert the State to any future modifications to the ordinance (Explanation of Significant Differences to the Record of Decision USEPA/MPCA, 2008).

The ESD was completed by MPCA, with concurrence from U.S. EPA to document significant changes in the remedy including for ICs. Section IV.A. of the ESD documented Significant Differences to the ROD Remedial Action for Implementation of Institutional Controls. It stated the following:

Although no institutional controls were called for in the 1985 ROD, the Township of South Bend enacted an ordinance in 1987 restricting the use of groundwater for drinking in the Le Hillier neighborhood. This ESD serves to document the enactment of this ordinance as an institutional control. Currently, the Township is in the process of updating the ordinance. The updated ordinance will include a map of the restricted area, provisions about restrictions related to temporary dewatering during construction activities, and prohibitions against tampering with site monitoring wells. In addition, the Township will also enter into a Memorandum of Understanding with MPCA in which it will agree to alert the State to any future modifications to the ordinance. The draft ordinance, map of proposed restricted area, and draft Memorandum of Understanding are included in Attachment 2.

Based on inspections and interviews with city officials, neither the EPA nor MPCA is aware of any wells installed within the groundwater restricted area. The groundwater restriction ordinance appears to be functioning as intended.

System Operations and Maintenance

Groundwater extraction was discontinued in 1997 and the pump-out system was dismantled in 2007 (MPCA, 2007; USEPA/MPCA, 2008), except for pump-out well PW-2 which was left in place. The MPCA is performing periodic groundwater sampling and analysis at select monitoring wells. In June 2010, samples were collected from sixteen site monitoring wells. In November 2010 samples were collected from the sixteen site monitoring wells, the two Ranney collectors (Well No. 13 and Well 15) and the South Bend Township Mt. Simon well (MVTL, 2010).

PW-2 still remains in place but is inoperable as vandalism has severely damaged the control box of that well. If a decision is made to restart the well, repairs will be needed.

V. Progress Since the Last Review

The last five-year review, completed in 2006, included the following protectiveness statement:

The remedy is functioning as intended and is protective of human health and the environment in the short-term. Long-term protectiveness needs to be verified via the recommended follow-up actions. The remedy would be confirmed to be fully protective once the recommendations and follow-up actions presented in Section IX are implemented.

The recommendations of the 2006 review are summarized below:

Issue	Recommendation and Follow up Action	Party Responsible	Action Taken and Outcome
The possible impacts of the Ranney Collector, municipal well 15, on the groundwater flow and quality in the vicinity of the Site is unknown.	The engineering analysis and pumping test conducted by the City of Mankato will be reviewed to confirm that the new municipal well will not have an adverse impact on the plume and groundwater quality.	MPCA	The document titled "Construction and Performance Test Report for Horizontal Collector Well 15, Mankato, Minnesota" (Reynolds, Inc., 2006) was reviewed to evaluate how much pumping from the Collector Well 15 alters groundwater levels and how that alteration could potentially influence the site's related groundwater VOC plume. Drinking Water Laboratory Report prepared by Underwriters Laboratories Inc. prepared in June 2006 was also reviewed to see if groundwater samples from the Collector Well 15 show any trace of VOC contamination.

<p>Institutional controls are not in place to restrict installation of private and municipal groundwater wells in the area of the site where groundwater performance standards have not been met.</p>	<p>The need for institutional controls will be evaluated.</p>	<p>MPCA</p>	<p>USEPA and MPCA met with representatives of South Bend Township regarding the possible presence of private wells at or near the site and the need to establish a new and revised Ordinance prohibiting construction of new wells and the use of existing wells (if not yet abandoned) within the site's contaminated area. Such revised Ordinance would serve as an institutional control established in addition to the SWBCA established for the site by MDH in 1981. The revised Ordinance prohibiting construction of new wells and use of the existing wells at the site was discussed with representatives of South Bend Township during the USEPA and MPCA's visit to the site on November 16, 2010.</p>
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<p>A number of site and city monitoring wells were damaged and may require maintenance and some site wells could not be located.</p>	<p>Site and City of Mankato monitoring wells will be located. Damaged wells will either be repaired or properly abandoned.</p>	<p>MPCA</p>	<p>In 2007, MPCA issued a letter to USEPA regarding decommissioning of the LeHillier Pumpout System (MPCA, 2007). Six pump-out wells were abandoned (PW-6 in 2006 and PW-1, PW-3, PW-4, PW-5 and PW-7 in November 2007). PW-2 was left in place in case it was needed in the future to prevent the TCE's plume migration to the north (toward the Wells 13 and 15). The air stripper tower installation was also demolished. PW-2 was retained as a contingency in the event additional remedial actions are necessary in the future. Also in November of 2007, the following 14 monitoring wells were abandoned: 3RX, 4RX, 5RX, 6S, 7S, 8S, 13S, 14S, 16S, 17S, 18S, 28, 29 and 43 (West Central Environmental Consultants, 2008a). In addition, the following three wells were abandoned in June 2008: MW-2S, MW-2D and MW-30.</p> <p>In December 2007, the new well 28D-R (replacement well) was installed to replace the abandoned well 28D. Finally, in May and June of 2008, the following five monitoring wells were installed to replace the old, damaged monitoring wells: 2S-R, 2D-R, 18S-R, 4 and 30D-R (West Central Environmental Consultants, 2008b). The existing and abandoned wells are shown on Figure 8.</p>
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VI. Five-Year Review Process

Administrative Components

This fourth five-year review was initiated on August 23, 2010. The review components included:

- Community notification and involvement;
- Document review;
- Data review;
- Site inspection;
- Local interviews; and
- Report development and review.

Community Involvement

USEPA and MPCA communicated with representatives of South Bend Township (Chairman Doug Schaller) and representatives of the City of Mankato (Mary Fralish - Deputy Director of Public Works, Environmental Services; Bill Janssen – Utility Supervisor) regarding the Five Year Review and arranged meetings to discuss the site's status and issues. These meetings took place on November 16, 2010.

MPCA issued a legal notice announcing that a five-year review was being conducted for the LeHillier Superfund site (Figure 7). That notice was published in the *Mankato Free Press* on October 9th, 16th and 23rd, 2010. No comments have been received.

Document Review

This five-year review consisted of a review of relevant documents referenced throughout this five-year review document, including the ROD, assessment reports, MPCA staff correspondence and the previous five-year review reports. A list of the documents reviewed is presented in Attachment B.

Data Review

Groundwater samples collected from select monitoring wells have been analyzed for VOCs since the mid-1980s. The available TCE data from the mid-1980s through 2010 is presented in Attachment C, Table 1. The data were provided by the MPCA and USEPA (MPCA has been collecting groundwater samples in recent years). Historically, the highest concentrations of TCE were detected in groundwater in four general locations – just to the south of the railroad tracks (monitoring wells 4S, 4D, 5S, and 5D); just to the north of the railroad tracks (monitoring well 8S); in the southeast area of the site (monitoring wells 18S, W28 and W30 and pump-out well PW-7); and in the south-central area of the site (well W24).

TCE has not exceeded the performance standard of 2.8 ug/l in wells 4S, 5S, 5D, or 8S since 1994. Well 4D remains the well most contaminated with TCE, although concentrations show a clear downward trend (see Graph 1, Attachment D). The concentration of TCE in 4D was 13 ug/L on 6/1/10 and 12.1 ug/L on 11/22/10. TCE was not detected in monitoring well 8S since 1998 and the well was abandoned in November 2007.

TCE concentrations in monitoring well 18S have been below the 5 ug/l performance standard since 1994. The monitoring wells W28D and W30D, which are adjacent to monitoring well 18S, exceeded the standard until their abandonment in 2007. Both of these wells were replaced by W28D-R and W30D-R. TCE concentrations measured in 2008, 2009 and 2010 in W28D-R were below the standard and TCE was not detected in W30D-R in 2009 and 2010.

Except for one sample collected in 1989, TCE concentrations measured in well W24 were above the original performance standard of 2.8 ug/l until 2005 – the last year it was sampled. This well was abandoned in 2007 and replaced by a new well, W-24-R. This new well was sampled during the last three sampling events (in 2008, 2009 and 2010) and TCE was below the detection limit.

Out of the 16 monitoring wells sampled during the last two years (all the wells that were not abandoned or the wells that were replaced), the TCE concentration was measured to be present above the detection level in only three wells: 4D, 5D and 28D-R. Only one well, 4D shows TCE contamination above the ROD set standard and MCL/HRL/ESD standards, however, concentrations in this well, as well as in the other two wells show a clear downtrend (see Graph 1 provided in Attachment D). These data indicate that the TCE plume is shrinking in aerial extent and in terms of concentrations. The maximum TCE concentrations measured in the well 4D in 2010 are below the MPCA “Ground Water Screening Value for Vapor Intrusion Pathway (GW_{ISV}) for TCE (20 ug/l) (MPCA, 2010). Thus, vapor intrusion into residential homes in the plume area is not a concern.

No other VOCs have been detected in the samples collected in recent years, including the typical degradation products of TCE – dichloroethenes and vinyl chloride.

Site Inspection

A site inspection was conducted on November 16, 2010 as part of the five-year review process. The participants of this inspection included: Stephanie Linebaugh of USEPA, Region V, Nile Fellows of MPCA, Kurt Schroeder of MPCA and Peter Rzepecki of AECOM (MPCA's consultant).

Participants of that site inspection managed to locate all of the sixteen site monitoring wells, including those that were left in place after the 2007 wells' abandonment, and the new replacement wells that were installed in 2007 and 2008. All of the monitoring wells appeared to be in a good condition. Photos of all the located wells are provided in the Attachment E.

The only remaining remedial pump-out well PW-2, was found to be present in a good shape, except that the control (circuitry) box next to the well was found to be vandalized and damaged. Thus, resuming pumping from that well would require significant repairs. At this time EPA and MPCA do not anticipate resuming pumping and therefore these repairs do not constitute an issue for this site. The results of the site inspection are summarized on the site Inspection Checklist provided in the Attachment F.

Interviews

No interview was conducted with a representation of the responsible party since no such party has been identified.

During the site visit on November 16, 2010, two meetings were held: one with representatives of South Bend Township, the other with representatives of the City of Mankato. The meeting with representatives of South Bend Township was focused on discussing the new ordinance to be introduced by the Township, prohibiting the use of existing or installation of new water supply wells at the Site. During the meeting with representatives of the City of Mankato, discussion focused on possible interaction between pumping from the Municipal Wells No. 13, 15 and the new well planned to be constructed nearby on the other side of the Minnesota River (both existing wells and the planned well Ranney Collectors) and the site's TCE plume.

No other community members or residents were interviewed. In general, the awareness of the site in the community appears to be low as no one responded to the public notice of the 5-year review.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents? Yes.

Four remedial goals and objectives were specified in the ROD:

- Adequately protect the public against exposure to TCE through direct contact or ingestion of groundwater from a private and public water supply.
- Adequately protect the public against exposure to TCE released to surface water from the groundwater.
- Adequately protect and minimize damage to the environment from the migration of TCE in the groundwater.
- Reduce the levels of TCE to less than 2.8 ug/l within a five to ten year time period. This last goal was changed by ESD to 5 ug/l.

The first three remedial goals have been met:

(1) Private drinking water wells were abandoned and water from a public water supply system was provided to the affected residences and businesses; in addition, the South Bend Township issued an ordinance in 1987 prohibiting the use of existing private water supply wells and installation of new wells within the Site. In 2007 Blue Earth County identified 10 locations that they were not sure of concerning the well status. Site visits to the locations verified 5 locations without wells, two were vacant and three were non responsive;

(2) The TCE concentrations at all monitoring wells, but specifically those monitoring wells nearest to the rivers, are significantly lower than the Minnesota Surface Water Quality Standard for TCE for 2B waters – 120 ug/L; and

(3) During the last two years of monitoring, the TCE concentration was less than the laboratory reporting level in 13 of the 16 monitoring wells at the Site. The monitoring data clearly indicate that the TCE plume has significantly decreased in areal extent and concentrations in the three wells with detections show distinctly decreasing trends (see Graph 1 provided in Attachment D).

During testing of the Well No. 15 (horizontal collector Well No. 15 constructed in 2006) the draw-downs (lowering of water level in aquifer) caused by pumping from that well were measured to be 0.35 ft at a distance of about 450 ft south of that well (monitoring well 4 shown on Figure 9) and 0.28 ft about 650 ft south of the well (monitoring well 5 also shown on Figure 9). Although no pump test data are available for the Well No. 13 (another collector well at the site), it is assumed that the drawdowns and cone of depression caused by pumping that well are not larger than for the Well No. 15. This assumption is based on a similar water production from both wells and the fact that three of the Well No. 13 Ranney collector's arms extend below the Blue Earth River.

The City of Mankato also anticipates construction of a third Ranney collector, not far away from Municipal Well No. 15, but on the other side of the Minnesota River. Production from that well

is also judged very unlikely to influence the site's TCE plume. That well will be further away from the site than Wells 13 and 15. In addition, recharge from the river will diminish drawdowns caused by pumping from that new well that could be observed on the other side of the river (where the site is).

The site's only monitoring well with TCE concentrations above the drinking water criterion, 4D, is located about 2,400 ft from the Well No. 15 and about 2,600 ft from the Well No. 13. No VOCs were detected in the sample collected from either of those municipal wells in November 2010.

Considering all the above, it is concluded that water production from the municipal wells is very unlikely to affect hydraulic gradients in the Sites' TCE contaminated aquifer. It is even less likely for those wells to intercept the site's TCE plume.

In the unlikely case that such pumping would induce the plume to migrate toward the municipal wells, dispersion would lower TCE concentrations to levels below the drinking water criterion a short distance from the monitoring well 4D (this is the monitoring well with the highest TCE concentration measured in 2010). Hydrodynamic dispersion is also likely to be a very effective attenuation mechanism at the site due to significant fluctuations of water level caused by frequently and profoundly changing stage of the Blue Earth River and the Minnesota River.

The fourth remedial action goal was to reduce the levels of TCE to less than 5 ug/l within a five to 10 year time period. The 2009 and 2010 sampling data indicates that the remedy has reduced the TCE concentration below 5 ug/l throughout the remnant plume except for one monitoring well, 4D. Because of the low concentrations and the limited extent of the plume, it is doubtful whether further active remedial actions would result in an extra reduction in the TCE concentration at the three wells with detected contamination, beyond the current rate that is likely to occur due to natural attenuation factors, primarily hydrodynamic dispersion.

All residents are connected to municipal water. In addition, the presence of the institutional controls in the form of the SWBCA established in 1981 (and permitting process imposed by it), South Bend Township's Ordinance issued in 1987 and the planned issuance by the South Bend Township of the new Ordinance, will prevent the residents' exposure to the TCE's contaminated groundwater. Long-term protectiveness requires compliance with effective ICs to ensure that the remedy continues to function as intended. Compliance with effective ICs will be ensured through implementing, maintaining, monitoring and enforcing effective ICs.

The highest TCE concentration measured in November of 2010 (12.1 ug/l in monitoring well 4D) is far below the Minnesota surface water quality standard for TCE for 2B class of waters (120 ug/l). Thus, the site's contamination is not significantly impacting the neighboring environment.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? Yes.

The RAOs (listed in Section IV) established at the time of the remedy selection are still valid, except that the ROD Cleanup Level of 2.8 ug/l for TCE was replaced with the Revised Cleanup Level of 5 ug/l (see discussion in Section IV) (USEPA / MPCA, August 2008 – Explanation of Significant Differences, LeHillier/Mankato Site, EPA ID: MND980792469, Mankato, MN).

Question C: Has any other information come to light that could question the protectiveness of the remedy? No.

There have been no changes to the groundwater remedy at the LeHillier Superfund site since completion of the last five-year review that have impacted the effectiveness of the remedy. While in 2005-2006 the city of Mankato constructed a second Ranney Collector (Municipal Well 15) in Land of Memories Park to the southwest of the existing Ranney Collector (Municipal Well 13), water production from this new well is not likely to affect the site's TCE plume. The third Ranney Collector well planned to be constructed nearby on the other side of the Minnesota River is also not likely to affect the TCE plume.

There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

The remedy is functioning as intended by the decision documents.

The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection are still valid, except that the ROD Cleanup Level of 2.8 ug/l for TCE has been replaced with the Revised Cleanup Level of 5 ug/l.

Water production from the second Ranney Collector (Municipal Well 15) constructed in 2005-2006 by the city of Mankato is not likely to affect the site's TCE plume. It is even less likely that the TCE plume will be affected by water production from the third Ranney collector well planned by the City of Mankato to be constructed near the Well No. 15.

Section VIII. Issues

No issues were identified during this review period that would affect the protectiveness of the remedy.

During this five year review, it was noted that the site monitoring wells and pumping well PW-2 would need to be abandoned should USEPA and MPCA decide to close the site. This issue will be addressed, but does not affect the protectiveness of the remedy.

Section IX. Recommendations and Follow-up Actions

None

Section X. Protectiveness Statement

The remedy is functioning as intended and is protective of human health and the environment.

Section XI. Next Review

Some hazardous substances, pollutants or contaminants still remain in groundwater and soils at the LeHillier Superfund site. However, the only contaminant of concern for the site, TCE, is currently present above the clean-up goal (specified in ESD of 5 ug/l vs. the 12.1 ug/l measured in the November 22, 2010 sample) in a small area around monitoring well 4D. Considering the trends observed over the last twenty years of groundwater monitoring, this remnant plume is expected to continue shrinking. The primary mechanism responsible for that decrease of contamination levels is the ongoing mixing caused by wide fluctuations in groundwater levels in response to changes in Blue Earth River stage.

The next five-year review will be scheduled within five years of the signature date of this review.

**LeHillier/Mankato
Blue Earth County, MN**

MND980792469



Legend

- | | |
|-----------------------------------|----------------------|
| LeHillier/Mankato Site | COE Interceptor Pipe |
| Chicago and Northwestern Railroad | COE Pumping Station |
| Land of Memories Park | Municipal Wells |
| COE Levee | |

0 400 800 Feet

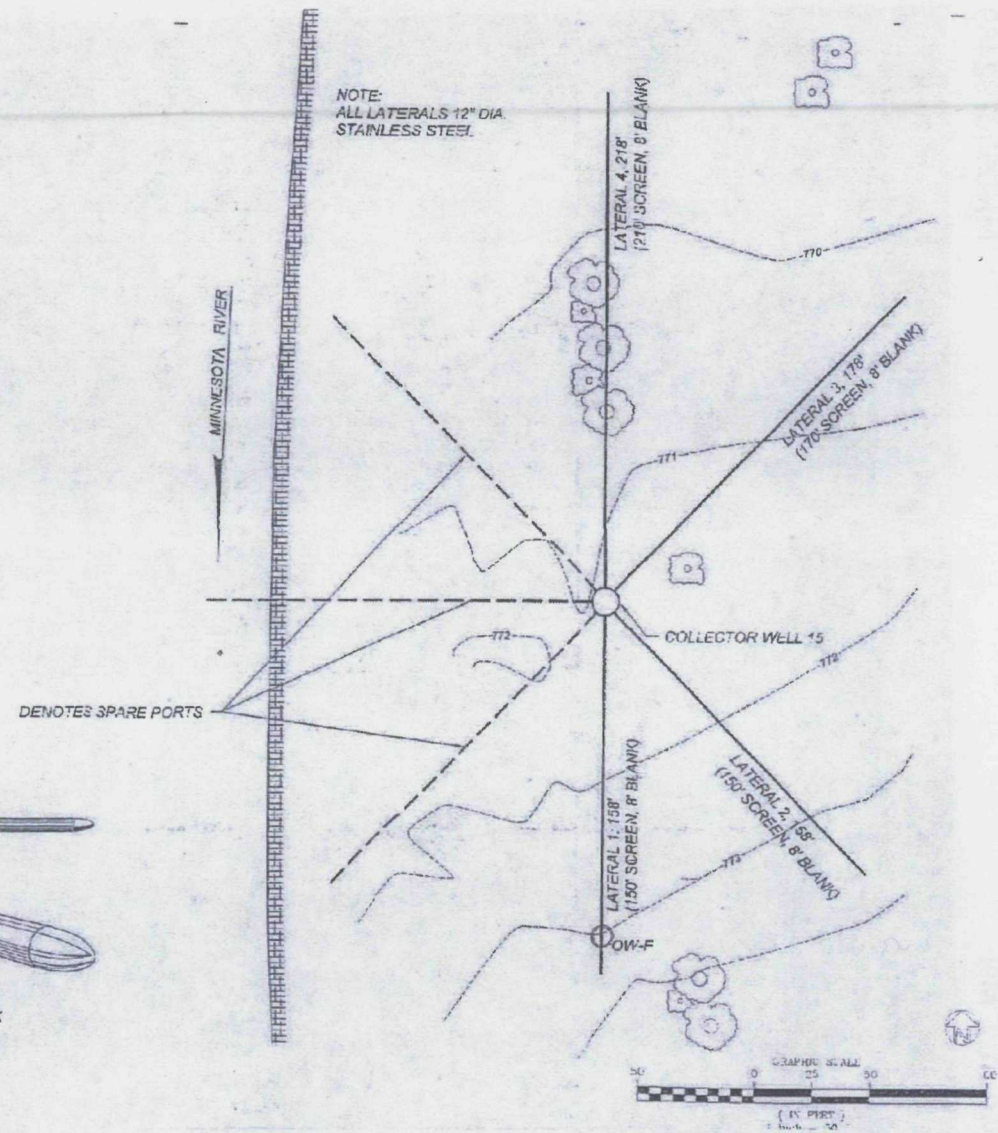
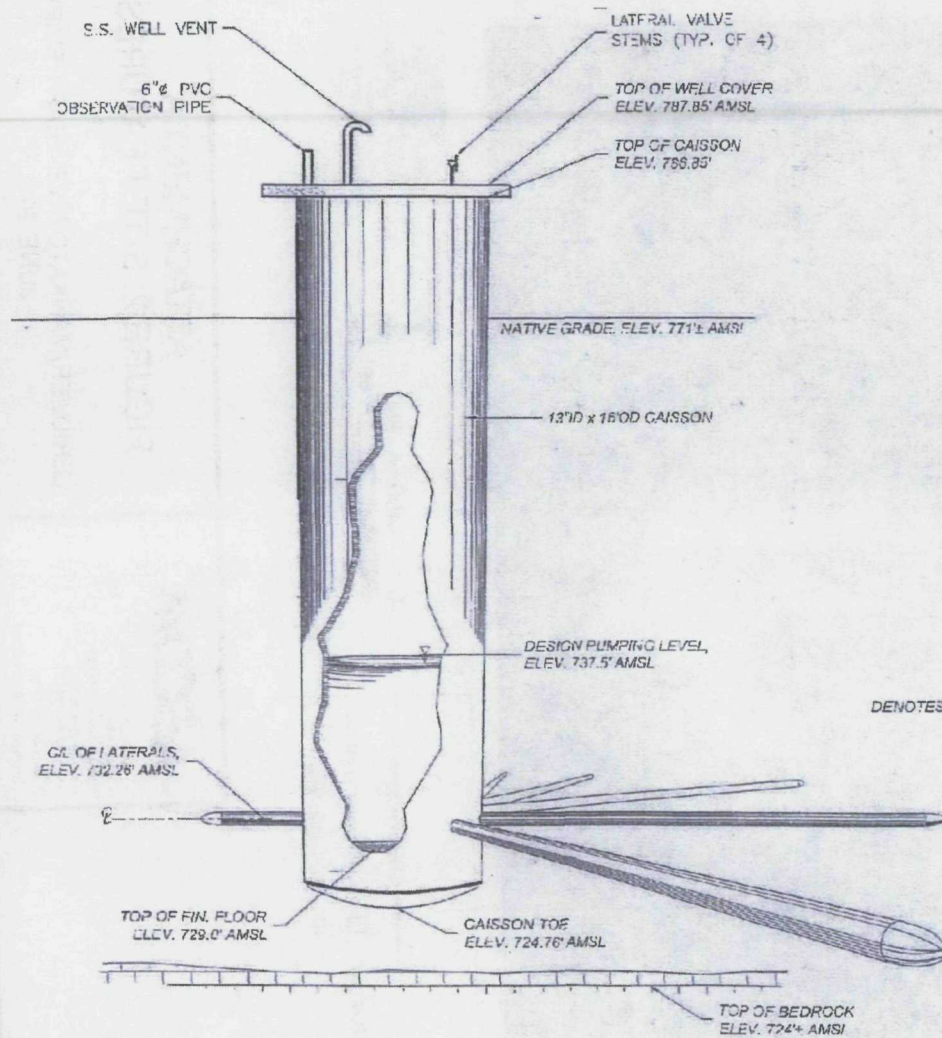


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**ATTACHMENT A
FIGURE 2: SITE FEATURES**

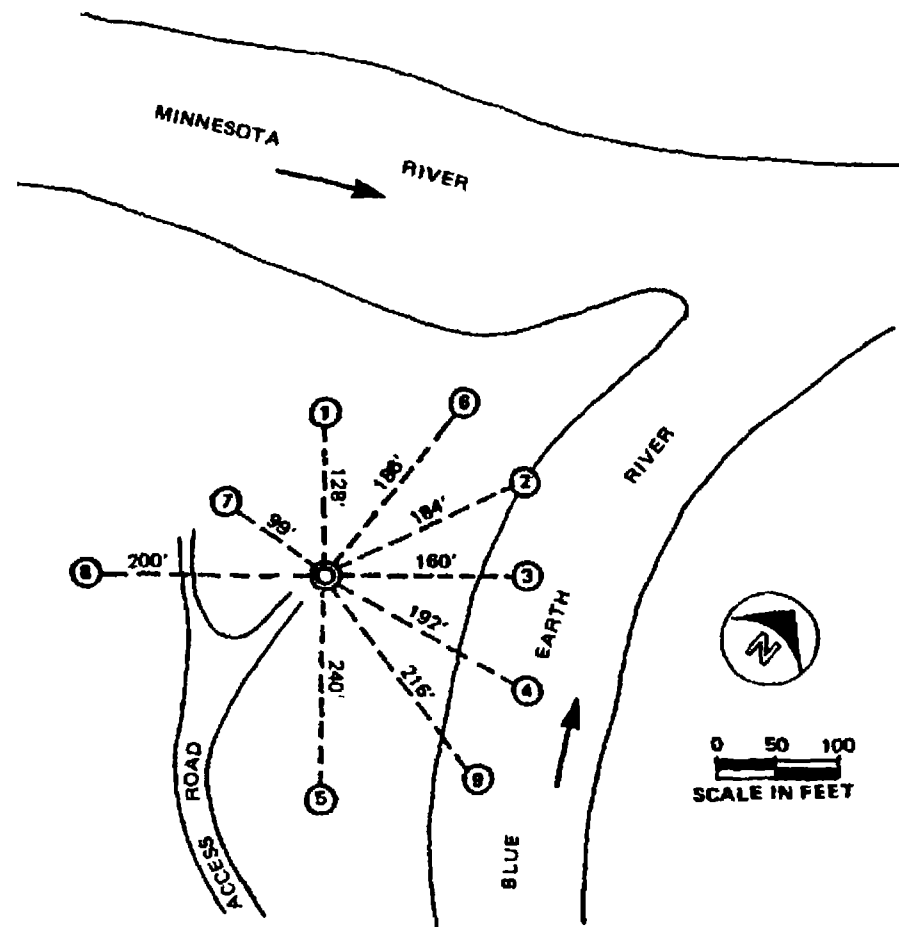
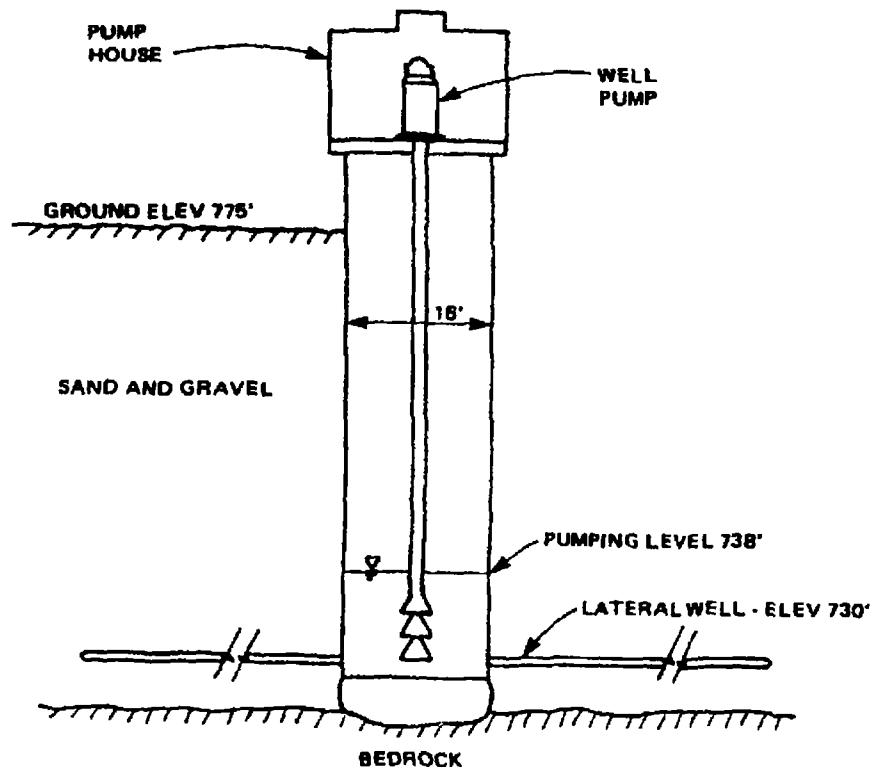
**LEHILLIER/MANKATO FIVE-YEAR REVIEW
JUNE 2011**



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ATTACHMENT A
FIGURE 3: PLAN AND CROSS-
SECTION OF COLLECTOR WELL 15
LEHILLIER/MANKATO FIVE-YEAR REVIEW
JUNE 2011



LEGEND

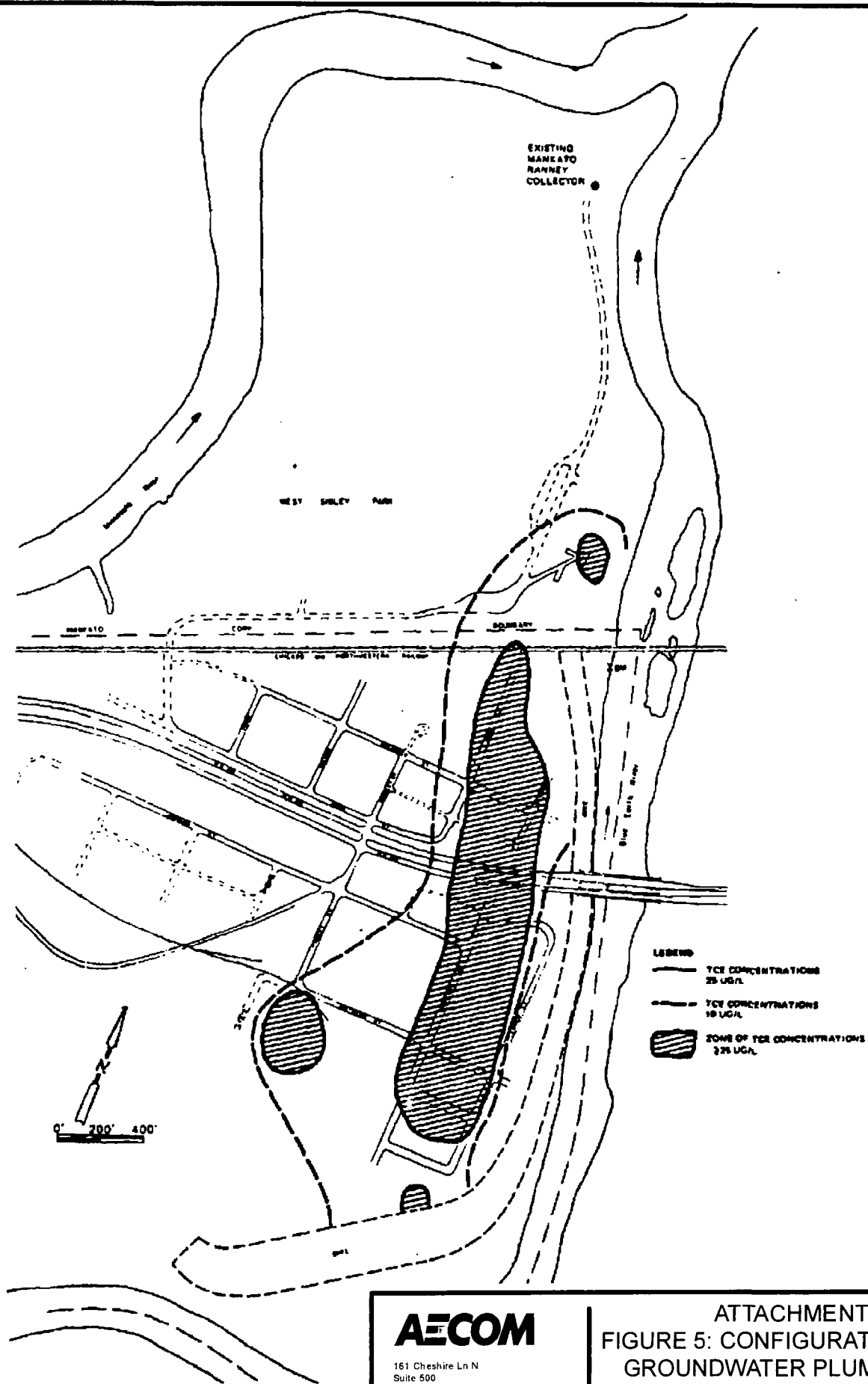
① - NUMBER AND LOCATION OF LATERAL WELL

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ATTACHMENT A
FIGURE 4: LOCATION AND
CONSTRUCTION OF MUNICIPAL WELL 13

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ATTACHMENT A
FIGURE 5: CONFIGURATION OF TCE
GROUNDWATER PLUME IN 1984

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JUNE 2011

**Lehillier/Mankato
Blue Earth County, MN**

MND980792469



Legend

- Lehillier/Mankato Site
- Chicago and Northwestern Railroad
- Extraction Wells
- Air Stripper

0 400 800 Feet



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**ATTACHMENT A
FIGURE 6: DIAGRAM OF
PUMP-OUT WELL LOCATIONS**

**LEHILLIER/MANKATO FIVE-YEAR REVIEW
JUNE 2011**

AFFIDAVIT OF PUBLICATION

State of Minnesota, ss.
County of Blue Earth

James P. Santori, being duly sworn, on oath says that he is the publisher or authorized agent and employee of the publisher of the newspaper known as The Free Press and The Land, and has full knowledge of the facts which are stated below:

(A) The newspaper has complied with all of the requirements constituting qualification as a legal newspaper, as provided by Minnesota Statute 331.02, 331.06, and other applicable laws, as amended.

(B) The printed _____ Notice _____

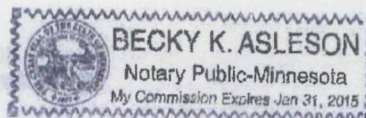
which is attached was cut from the columns of said newspaper, and was printed and published once each week, for 3 successive weeks; it was first published on Saturday, the 9 day of October, 2010, and was thereafter printed and published on every Saturday to and including Saturday, the 23 day of October, 2010; and printed below is a copy of the lower case alphabet from A to Z, both inclusive, which is hereby acknowledged as being the size and kind of type used in the composition and publication of the notice.

abcdefghijklmnopqrstuvwxyz

By: James P. Santori
Publisher

Subscribed and sworn to before me on this 23 day of October, 2010.

Becky K. Asleson
Notary Public



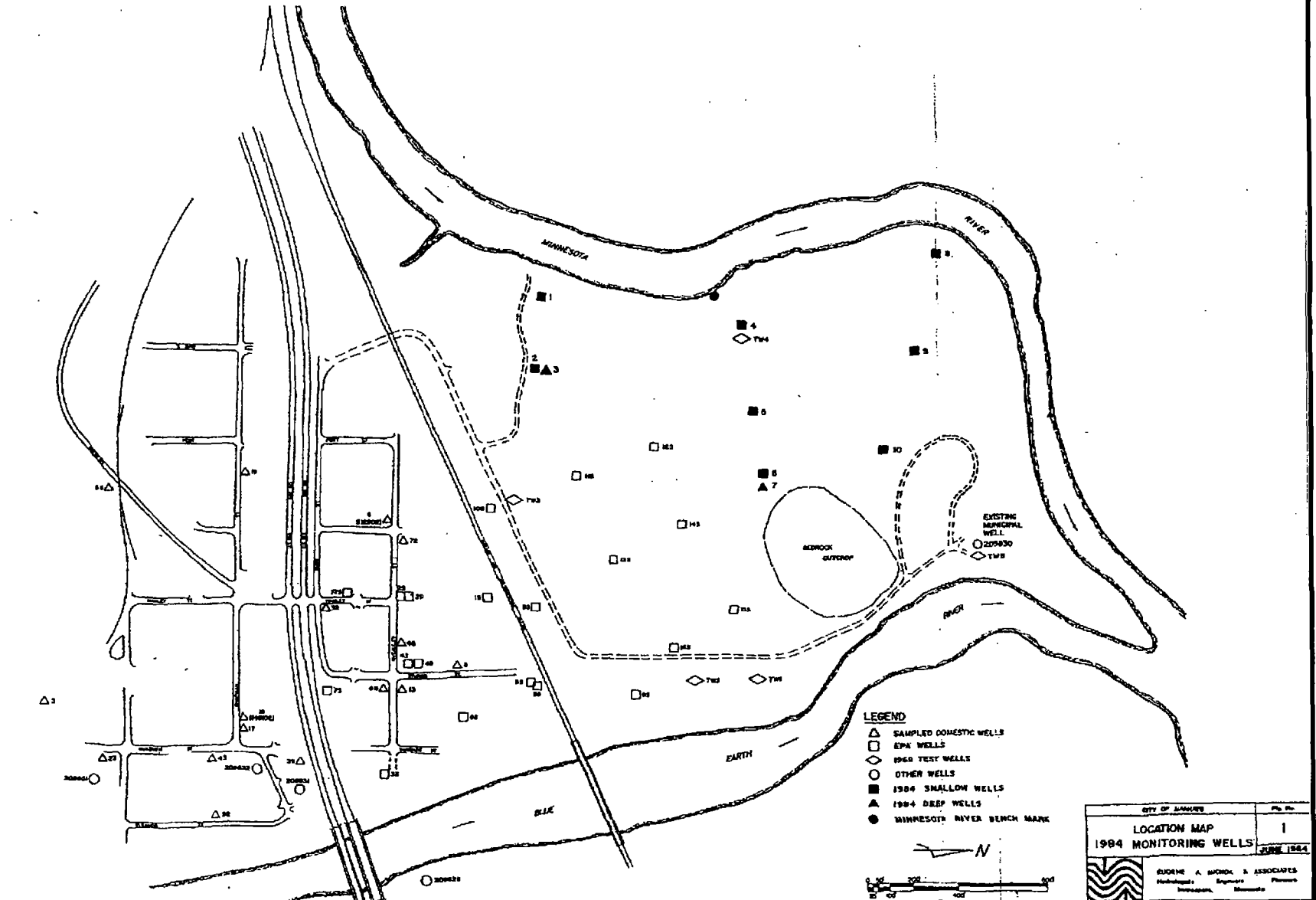
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ATTACHMENT A
FIGURE 7: PUBLIC NOTICE FOR
FIVE-YEAR REVIEW AND AFFIDAVIT
OF PUBLICATION
LEHILLIER/MANKATO FIVE-YEAR REVIEW
JUNE 2011

October 9, 16, 23, 2010
LEHILLIER SUPERFUND SITE
LeHillier / Mankato, Minnesota
The U.S. Environmental Agency and the Minnesota Pollution Control Agency are reviewing the effectiveness of the cleanup at the LeHillier Superfund site in LeHillier, Minnesota. Superfund law requires five-year reviews of sites where the cleanup is either done or in progress, but hazardous waste remains on site. These five-year reviews are done to ensure that the cleanup remains effective and protects human health and the environment. This is the fourth five-year review for this site. The first five-year review was completed in 1996, the second in 2001 and the third review was completed in 2006. All these reviews addressed overall site conditions. The reports concluded that the cleanup actions at the site created conditions protective of human health and the environment. Five-year reviews look at:
- site information
- how the cleanup was done
- how well the cleanup is working
- any future actions needed
Site records are at the MPCA, 520 Lafayette Rd., St. Paul, Minnesota. The MPCA is open Monday through Friday from 8:00AM to 4:00PM. To review the records, please contact Diane Mitzek, Records Manager at (651) 297-5177. Comments and questions will be accepted until November 30, 2010. Please, direct your comments or concerns regarding the cleanup to:
Nile Fellows
Project Manager
MPCA
520 Lafayette Road North
St. Paul, Minnesota 55155
651/787-2352
Nile.Fellows@state.mn.us





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ATTACHMENT A
FIGURE 9: MONITORING WELLS IN WEST
SIBLEY PARK (PROVIDED BY THE CITY OF
MANKATO)

LEHILLIER/MANKATO FIVE-YEAR REVIEW
JUNE 2011

Land of Memories Wells

- City of Mankato System Wells
- City of Mankato Monitoring Wells
- EPA Monitoring Wells



Map Produced by the City of Mankato
GIS Department: 1/7/2010

0 50 100 200 300 Feet

This information is to be used for reference purposes only. The City of Mankato does not guarantee accuracy of the material contained herein and is not responsible for misuse or misinterpretation.

City of Mankato Monitoring Wells		
Well ID	Latitude	Longitude
270323	44.16116	-94.04199
270324	44.160762	-94.04025
589765	44.1624	-94.0385
589764	44.1621	-94.038065
589766	44.16197	-94.03888
573182	44.15992	-94.04292

City of Mankato System Wells		
Well ID	Latitude	Longitude
Well 13 : 209830	44.162095	-94.03842
Well 14 : 458567	44.15958	-94.03916
Well 15 : 683899	44.16029	-94.04314



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ATTACHMENT A
FIGURE 10: MONITORING AND MUNICIPAL
WELLS IN WEST SIBLEY PARK (PROVIDED
BY THE CITY OF MANKATO)

LEHILLIER/MANKATO FIVE-YEAR REVIEW
JUNE 2011

Attachment B – List of Documents Reviewed

MDH, 1981. Le Hillier Special Well and Boring Construction Area and advisory sent in September of 1981 to licensed well contractors working in the Mankato area. Minnesota Department of Health – Well Management:
<http://www.health.state.mn.us/divs/eh/wells/swca/lehill.html>.

South Bend Township, 1987. Ordinance prohibiting use of groundwater for drinking in the area of Lehillier.

Reynolds, Inc., 2006. Construction and Performance Test Report for Horizontal Collector Well 15, Mankato, Minnesota. Reynolds, Inc. Ranney Services, Orleans, Indiana, July 2006

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Attachment C - Tables

Table 1
Monitoring Well TCE Data
Lehiller Superfund Site
Mankato, Minnesota

Sample	Monitoring Wells																														
Date	2S	2S-R	2D	2D-R	4S	4D	4RX	5S	5D	5RX	8S	11S	11D	12S	12D	13S	14S	15S	16S	17S	18S	18S-R	W24	W-24-R	W28D	W28D-R	W30D	W30D-R	W42	W43	
5/15/1986	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6/16/1986	-	-	-	-	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-	-	-	-	-	ND
6/17/1986	-	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	2.5	-	-	55	-	-	-	-	-	-	-	-	-	-
8/12/1987	ND	-	ND	-	3.7	74	ND	12	4.7	ND	26	ND	-	ND	-	0.7	0.2	7.9	6	ND	28	-	20	-	-	-	560	-	-	-	ND
4/16/1987	-	-	-	-	1.7	50	-	16	7.1	0.2	-	-	-	-	-	-	-	-	-	-	23	-	-	-	-	-	-	-	-	-	-
9/19/1989	-	-	-	-	11	100	-	11	24	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-
9/21/1989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	11	-	-	-	-	-	-	-	2.4	-	
3/13/1990	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2	-	-	-	
5/15/1991	-	-	-	-	1.8	42	-	-	-	-	-	-	-	-	-	-	ND	-	-	-	-	-	-	-	-	-	-	-	ND	0.1	
10/21/1991	-	-	-	-	3.7	38	-	-	-	-	-	-	-	-	-	-	3.9	-	-	-	-	-	-	-	-	-	-	-	-	ND	ND
6/3/1994	ND	-	ND	-	0.8	19	0.1	ND	0.4	1.1	-	-	-	-	-	0.4	-	2.2	-	-	1.5	-	17	-	39	-	-	-	-	ND	-
5/11/1995	-	-	ND	-	0.3	16	-	-	-	-	-	ND	-	-	-	-	0.5	-	-	-	-	-	9.8	-	15	-	-	-	-	ND	ND
5/29/1996	-	-	-	-	0.2	28	-	-	-	-	-	-	-	-	-	-	ND	1.8	-	-	-	-	14	-	19	-	-	-	-	-	-
10/9/1996	-	-	-	-	0.1	32	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	0.2	-	15	-	23	-	-	-	-	-	-
6/2/1997	-	-	-	-	-	37	-	-	1.0	-	-	ND	-	-	-	ND	ND	0.4	-	-	-	-	-	-	34	-	-	-	-	-	-
6/3/1997	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-
9/29/1997	-	-	-	-	ND	25	-	-	-	-	-	-	-	-	-	0.3	ND	ND	-	-	-	-	12	-	28	-	-	-	-	-	-
9/30/1997	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6/22/1998	-	-	-	-	0.2	27	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	8.3	-	14	-	1.4	-	-	-	-
12/1/1998	ND	-	ND	-	0.3	30	ND	0.2	0.8	-	ND	-	-	ND	-	-	0.1	0.5	0.1	-	-	-	-	-	18	-	-	-	-	ND	ND
12/2/1998	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	ND	0.7	-	6.2	-	-	-	3.5	-	-	-	-
9/7/1999	-	-	-	-	-	27.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.3	-	18.4	-	5.8	-	-	-	-
6/12/2000	-	-	-	-	0.7	29.6	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	6.1	-	3.8	-	9.1	-	-	-	-
11/13/2000	-	-	-	-	ND	24.4	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	7.6	-	4.1	-	6.7	-	-	-	-
4/4/2001	-	-	-	-	ND	23	ND	ND	1.3	ND	-	-	-	ND	-	-	-	0.8	-	-	-	-	6.2	-	4.2	-	7.5	-	ND	ND	ND
6/7/2002	-	-	-	-	ND	19.4	-	-	-	ND	-	-	-	-	-	-	-	-	-	-	0.9	-	6.9	-	8.8	-	6.7	-	-	-	-
9/19/2002	-	-	-	-	ND	20	-	-	-	ND	-	-	-	-	-	-	-	-	-	-	0.8	-	4.8	-	8.7	-	6.7	-	-	-	-
4/22/2005	-	-	-	-	ND	16.8	ND	ND	1.0	ND	ND	-	-	ND	-	-	ND	ND	ND	-	0.9	-	4.8	-	5.7	-	7.4	-	ND	ND	ND
5/23/2006	-	-	-	-	ND	18.7	ND	ND	1.1	ND	ND	-	-	ND	-	-	ND	ND	ND	-	0.7	-	-	-	11.4	-	10.4	-	ND	ND	ND
7/27/2007	NS	-	NS	-	ND	17.1	ND	ND	1.5	ND	ND	NS	-	ND	-	NS	ND	ND	ND	NS	ND	-	NS	-	10.9	-	11.5	-	ND	ND	ND
6/12/2008	R	ND	R	1.2	ND	18.1	AB	ND	ND	AB	AB	-	ND	ND	ND	AB	ND	ND	AB	AB	R	ND	R	ND	R	1.6	R	10	ND	AB	AB
5/4/2009	R	ND	R	ND	ND	15	AB	ND	ND	AB	AB	ND	ND	ND	ND	AB	AB	ND	AB	AB	R	ND	R	ND	R	-	R	ND	ND	AB	AB
6/1/2010	R	ND	R	ND	ND	13.1	AB	ND	1.1	AB	AB	ND	ND	ND	ND	AB	AB	ND	AB	AB	R	ND	R	ND	R	1.2	R	ND	ND	AB	AB
11/22/2010	R	ND	R	ND	ND	12.1	AB	ND	1.2	AB	AB	ND	ND	ND	ND	AB	AB	ND	AB	AB	R	ND	R	ND	R	2.3	R	ND	ND	AB	AB

Concentrations are expressed as micrograms per liter (ug/l)

ND - Not detected in a concentration at or above the laboratory reporting level

" - " Sample was not collected for analysis

NS - not sampled

TCE - Trichloroethylene

*** Not able to collect sample

A = abandoned

R = replaced

AB = well abandoned

NOTE: In the original data, the 2006 result for MW4D was 0.7 ug/l and the 2006 result for MW18S was 18.7 ug/l. It is believed that these two sample bottles were accidentally switched, so this revision has been incorporated into this spreadsheet.

New wells installed in 2007/2008:

Replacement for well 18S

New well 11D

New well 12D

Replacements for wells 2S and 2D

Replacement for well 28D

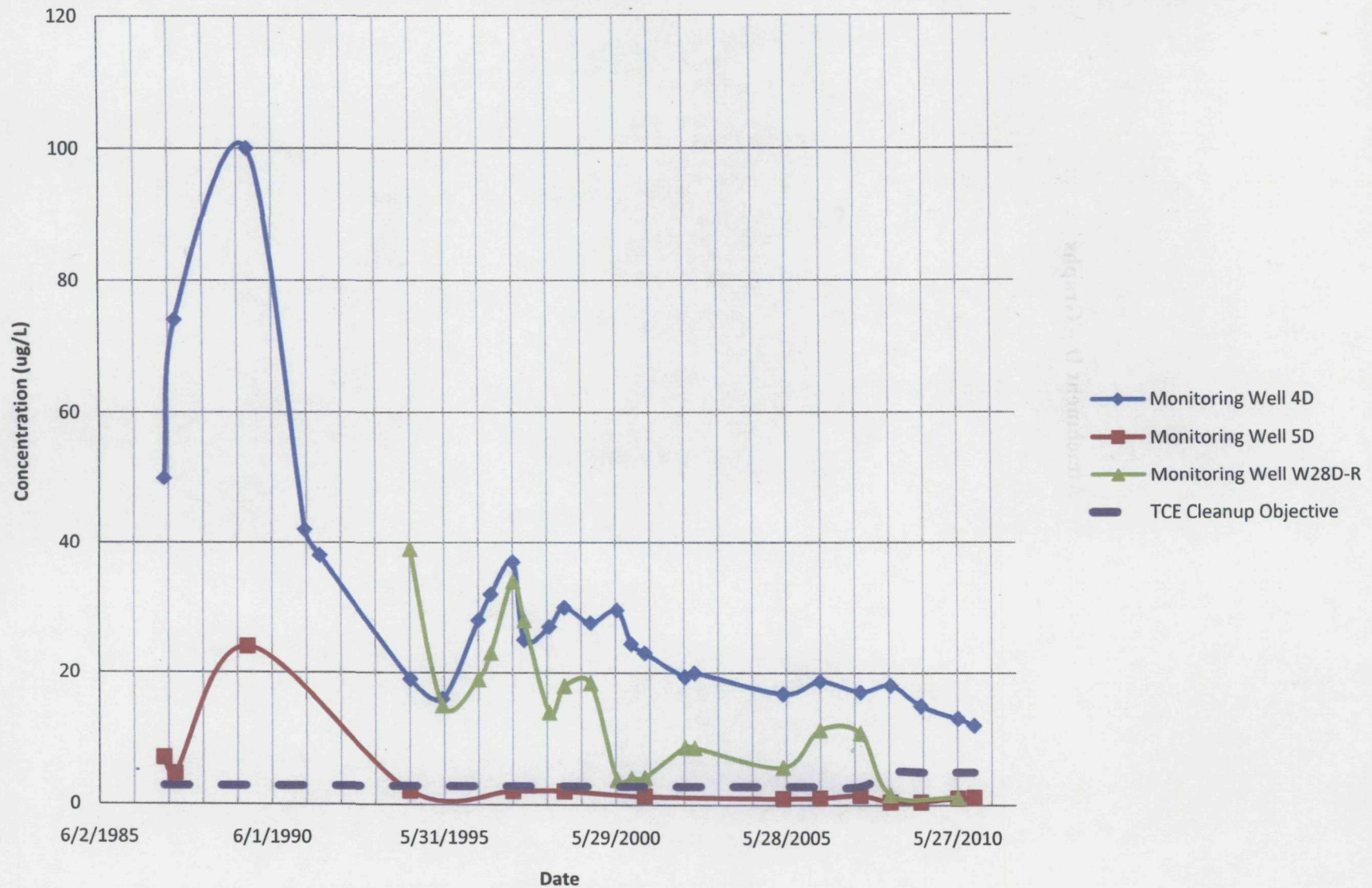
Replacement for well 24

Replacement for well 30

* Wells abandoned in 2007/2008: MW-3RX, MW-4RX, MW-5RX, MW-6S, MW-7S, MW-8S, MW-13S, MW-14S, MW-16S, MW-17S, MW-18S, MW-28, MW-29, MW-43, MW-2S, MW-2D, and MW-30

Attachment D – Graphs

**Graph 1 - TCE Concentrations in
the Most Impacted Lehillier Monitoring Wells, MN**

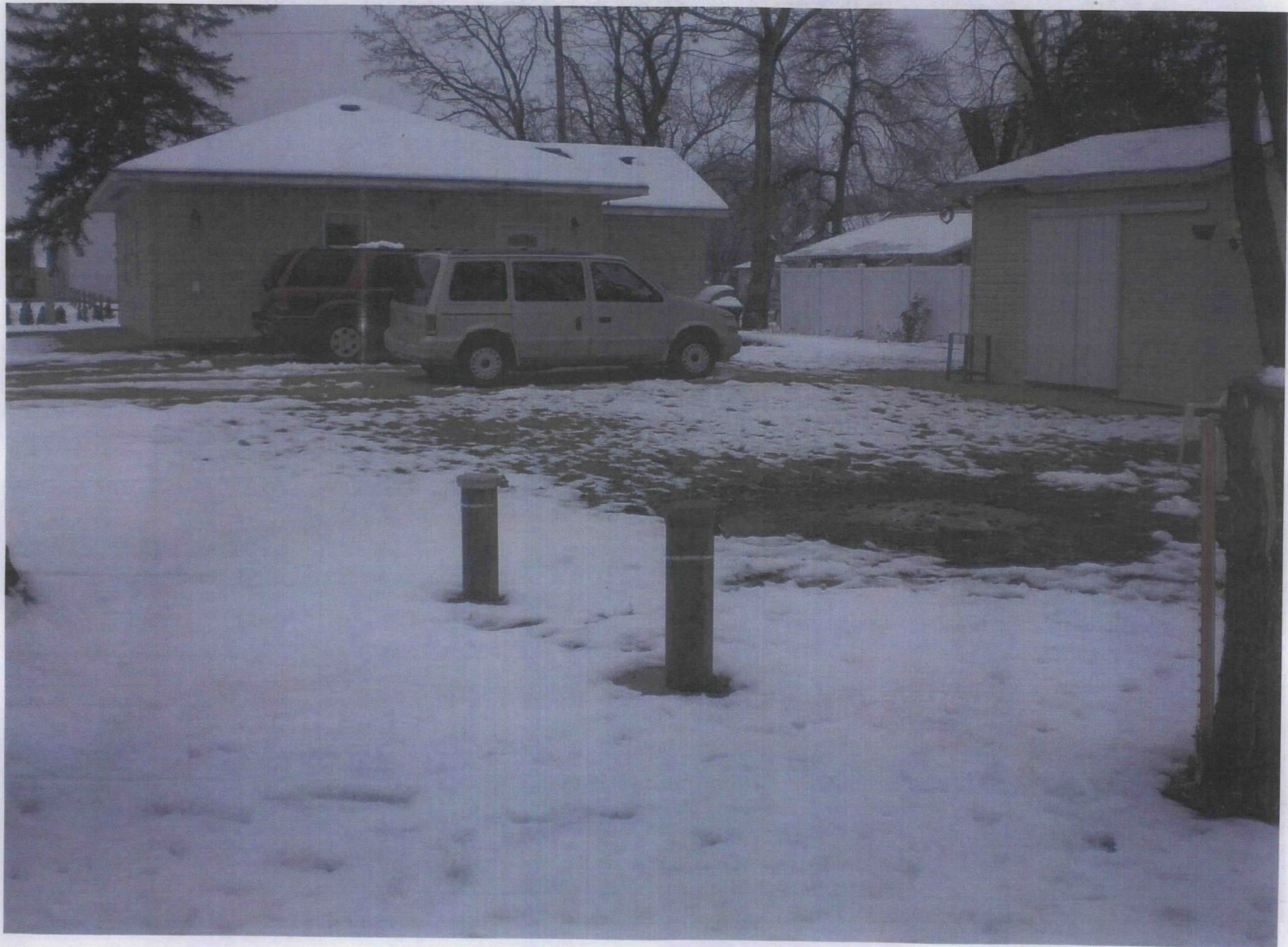


Attachment E – Photos Documenting Site Conditions on November 16th (20 photos)









WELL IDENTIFICATION LABEL
STATE OF MINNESOTA

WELL NO. 762553



WELL IDENTIFICATION LABEL
STATE OF MINNESOTA



WELL NO. 10-16255









WELL IDENTIFICATION
STATE OF MINNESOTA

3"-4"

UNIQUE WELL NO. 762556







WELL IDENTIFICATION LABEL
STATE OF MINNESOTA

WELL NO. 762553









Attachment F – Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION															
Site name: LeHillier / MANKATO SUPERFUND SITE		Date of inspection: 11/16/2010													
Location and Region: MANKATO, MN, REGIONS		EPA ID: MND980792469													
Agency, office, or company leading the five-year review: MPCA		Weather/temperature: CLOUDY, 32 F													
Remedy Includes: (Check all that apply) <table border="0"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input checked="" type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other</td> <td></td> </tr> </table>				<input type="checkbox"/> Landfill cover/containment	<input checked="" type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input checked="" type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other	
<input type="checkbox"/> Landfill cover/containment	<input checked="" type="checkbox"/> Monitored natural attenuation														
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment														
<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls														
<input checked="" type="checkbox"/> Groundwater pump and treatment															
<input type="checkbox"/> Surface water collection and treatment															
<input type="checkbox"/> Other															
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached															
II. INTERVIEWS (Check all that apply)															
1. O&M site manager N/A <table border="0"> <tr> <td>Name</td> <td>Title</td> <td>Date</td> </tr> <tr> <td colspan="3">Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____</td> </tr> <tr> <td colspan="3">Problems, suggestions; <input type="checkbox"/> Report attached _____</td> </tr> </table>				Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____			Problems, suggestions; <input type="checkbox"/> Report attached _____					
Name	Title	Date													
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____															
Problems, suggestions; <input type="checkbox"/> Report attached _____															
2. O&M staff N/A <table border="0"> <tr> <td>Name</td> <td>Title</td> <td>Date</td> </tr> <tr> <td colspan="3">Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____</td> </tr> <tr> <td colspan="3">Problems, suggestions; <input type="checkbox"/> Report attached _____</td> </tr> </table>				Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____			Problems, suggestions; <input type="checkbox"/> Report attached _____					
Name	Title	Date													
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____															
Problems, suggestions; <input type="checkbox"/> Report attached _____															

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION															
Site name: <u>LeHillier / MANUKATO SUPERFUND SITE</u>		Date of inspection: <u>11/16/2010</u>													
Location and Region: <u>MANUKATO, MN, REGION 5</u>		EPA ID: <u>MND 980792469</u>													
Agency, office, or company leading the five-year review: <u>MPCA</u>		Weather/temperature: <u>CLOUDY, 32 F</u>													
Remedy Includes: (Check all that apply) <table border="0"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input checked="" type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>				<input type="checkbox"/> Landfill cover/containment	<input checked="" type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input checked="" type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input checked="" type="checkbox"/> Monitored natural attenuation														
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment														
<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls														
<input checked="" type="checkbox"/> Groundwater pump and treatment															
<input type="checkbox"/> Surface water collection and treatment															
<input type="checkbox"/> Other _____															
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached															
II. INTERVIEWS (Check all that apply)															
1. O&M site manager <u>N/A</u>															
<table border="0"> <tr> <td>Name</td> <td>Title</td> <td>Date</td> </tr> <tr> <td colspan="3">Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____</td> </tr> <tr> <td colspan="3">Problems, suggestions; <input type="checkbox"/> Report attached _____</td> </tr> </table>				Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____			Problems, suggestions; <input type="checkbox"/> Report attached _____					
Name	Title	Date													
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____															
Problems, suggestions; <input type="checkbox"/> Report attached _____															
2. O&M staff <u>N/A</u>															
<table border="0"> <tr> <td>Name</td> <td>Title</td> <td>Date</td> </tr> <tr> <td colspan="3">Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____</td> </tr> <tr> <td colspan="3">Problems, suggestions; <input type="checkbox"/> Report attached _____</td> </tr> </table>				Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____			Problems, suggestions; <input type="checkbox"/> Report attached _____					
Name	Title	Date													
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____															
Problems, suggestions; <input type="checkbox"/> Report attached _____															

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency MPCA
Contact NILE FELLOWS PROJECT MANAGER 651-757-2352
Name Title Date Phone no.

Problems; suggestions; G Report attached

Agency _____
Contact _____

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; G Report attached

Agency _____
Contact _____

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; G Report attached

Agency _____		_____	
Contact _____	_____	_____	_____
Name	Title	Date	Phone no.

Problems; suggestions; G Report attached

4. **Other interviews (optional)** G Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	O&M Documents G O&M manual G As-built drawings G Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available N/A	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan G Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available N/A	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks _____	<input type="checkbox"/> Readily available N/A	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	Permits and Service Agreements G Air discharge permit G Effluent discharge G Waste disposal, POTW G Other permits Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available N/A	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	Gas Generation Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records G Air G Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A

IV. O&M COSTS																																																															
1.	O&M Organization <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____ </div> <div> <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility <div style="text-align: center; font-size: 1.5em;">N/A</div> </div> </div>																																																														
2.	O&M Cost Records <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Readily available <input type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ </div> <div> <input type="checkbox"/> Up to date <input type="checkbox"/> Breakdown attached <div style="text-align: center; font-size: 1.5em;">N/A</div> </div> </div> <p style="text-align: center; margin-top: 10px;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 20%;">To _____</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: center;">G Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: center;">G Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: center;">G Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: center;">G Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: center;">G Breakdown attached</td> </tr> </table>			From _____	To _____					Date	Date	Total cost			G Breakdown attached	From _____	To _____					Date	Date	Total cost			G Breakdown attached	From _____	To _____					Date	Date	Total cost			G Breakdown attached	From _____	To _____					Date	Date	Total cost			G Breakdown attached	From _____	To _____					Date	Date	Total cost			G Breakdown attached
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3.	Unanticipated or Unusually High O&M Costs During Review Period Describe costs and reasons: _____ <div style="text-align: center; font-size: 1.5em; margin-top: 20px;">N/A</div>																																																														
V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A																																																															
A. Fencing																																																															
1.	Fencing damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured G N/A Remarks _____																																																														
B. Other Access Restrictions																																																															
1.	Signs and other security measures <input type="checkbox"/> Location shown on site map G N/A Remarks <u>SOUTH BEND TOWNSHIP IS IN A PROCESS OF DEVELOPING ORDINANCE RESTRICTING USE OF CONTAMINATED GROUNDWATER</u>																																																														

C. Institutional Controls (ICs)				
1.	Implementation and enforcement Site conditions imply ICs not properly implemented Site conditions imply ICs not being fully enforced Type of monitoring (e.g., self-reporting, drive by) _____ Frequency _____ Responsible party/agency _____ Contact _____ <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Name Title Date Phone no. </div> Reporting is up-to-date Reports are verified by the lead agency Specific requirements in deed or decision documents have been met Violations have been reported Other problems or suggestions: G Report attached	G Yes G No G Yes G No	<input checked="" type="radio"/> N/A <input checked="" type="radio"/> N/A	
2.	Adequacy Remarks _____ _____ _____	G ICs are adequate G ICs are inadequate	<input checked="" type="radio"/> N/A	
D. General				
1.	Vandalism/trespassing Remarks <u>CIRCUITRY BOX ON PW-2 DAMAGED</u>	G Location shown on site map G No vandalism evident		
2.	Land use changes on site G N/A Remarks <u>NO CHANGES EXCEPT THE CITY OF MANUKATO CONSTRUCTED A NEW MUNICIPAL WELL NO. 15</u>			
3.	Land use changes off site G N/A Remarks <u>NO CHANGES</u>			
VI. GENERAL SITE CONDITIONS				
A. Roads G Applicable G N/A				
1.	Roads damaged Remarks <u>C</u>	G Location shown on site map G Roads adequate	<input checked="" type="radio"/> N/A	

B. Other Site Conditions			
Remarks <u>ALL MONITORING WELLS ARE IN</u> <u>GOOD CONDITION</u>			
VII. LANDFILL COVERS G Applicable <u>G N/A</u>			
A. Landfill Surface			
1.	Settlement (Low spots) Areal extent _____ Remarks _____	G Location shown on site map Depth _____	G Settlement not evident
2.	Cracks Lengths _____ Widths _____ Depths _____ Remarks _____	G Location shown on site map	G Cracking not evident
3.	Erosion Areal extent _____ Remarks _____	G Location shown on site map Depth _____	G Erosion not evident
4.	Holes Areal extent _____ Remarks _____	G Location shown on site map Depth _____	G Holes not evident
5.	Vegetative Cover G Trees/Shrubs (indicate size and locations on a diagram) Remarks _____	G Grass G Cover properly established	G No signs of stress
6.	Alternative Cover (armored rock, concrete, etc.) Remarks _____	G N/A	
7.	Bulges Areal extent _____ Remarks _____	G Location shown on site map Height _____	G Bulges not evident

8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Areal extent _____ Areal extent _____ Areal extent _____ Areal extent _____
9.	Slope Instability Areal extent _____ Remarks _____	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of slope instability
B. Benches <input type="checkbox"/> Applicable <input checked="" type="radio"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	Flows Bypass Bench Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
2.	Bench Breached Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="radio"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Remarks _____	<input type="checkbox"/> Location shown on site map Areal extent _____	<input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> No evidence of erosion

4.	Undercutting Areal extent _____ Remarks _____	G Location shown on site map Depth _____	G No evidence of undercutting
5.	Obstructions Type _____ G Location shown on site map Size _____ Remarks _____	G No obstructions Areal extent _____	
6.	Excessive Vegetative Growth Type _____ G No evidence of excessive growth G Vegetation in channels does not obstruct flow G Location shown on site map Remarks _____	Areal extent _____	
D. Cover Penetrations G Applicable <u>G N/A</u>			
1.	Gas Vents G Properly secured/locked G Evidence of leakage at penetration G N/A Remarks _____	G Active G Passive G Functioning G Needs Maintenance	G Routinely sampled G Good condition
2.	Gas Monitoring Probes G Properly secured/locked G Evidence of leakage at penetration Remarks _____	G Functioning G Needs Maintenance	G Routinely sampled G Good condition G N/A
3.	Monitoring Wells (within surface area of landfill) G Properly secured/locked G Evidence of leakage at penetration Remarks _____	G Functioning G Needs Maintenance	G Routinely sampled G Good condition G N/A
4.	Leachate Extraction Wells G Properly secured/locked G Evidence of leakage at penetration Remarks _____	G Functioning G Needs Maintenance	G Routinely sampled G Good condition G N/A
5.	Settlement Monuments Remarks _____	G Located	G Routinely surveyed G N/A

E. Gas Collection and Treatment		G Applicable	<u>G N/A</u>
1.	Gas Treatment Facilities G Flaring G Thermal destruction G Collection for reuse G Good condition G Needs Maintenance Remarks _____		
2.	Gas Collection Wells, Manifolds and Piping G Good condition G Needs Maintenance Remarks _____		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) G Good condition G Needs Maintenance G N/A Remarks _____		
F. Cover Drainage Layer		G Applicable	<u>G N/A</u>
1.	Outlet Pipes Inspected G Functioning G N/A Remarks _____		
2.	Outlet Rock Inspected G Functioning G N/A Remarks _____		
G. Detention/Sedimentation Ponds		G Applicable	<u>G N/A</u>
1.	Siltation Areal extent _____ Depth _____ G N/A G Siltation not evident Remarks _____		
2.	Erosion Areal extent _____ Depth _____ G Erosion not evident Remarks _____		
3.	Outlet Works G Functioning G N/A Remarks _____		
4.	Dam G Functioning G N/A Remarks _____		

H. Retaining Walls		G Applicable	<u>G N/A</u>
1.	Deformations Horizontal displacement _____ Rotational displacement _____ Remarks _____	G Location shown on site map	G Deformation not evident
2.	Degradation Remarks _____	G Location shown on site map	G Degradation not evident
I. Perimeter Ditches/Off-Site Discharge		G Applicable	<u>G N/A</u>
1.	Siltation Areal extent _____ Remarks _____	G Location shown on site map	G Siltation not evident
2.	Vegetative Growth G Vegetation does not impede flow Areal extent _____ Remarks _____	G Location shown on site map	G N/A
3.	Erosion Areal extent _____ Remarks _____	G Location shown on site map	G Erosion not evident
4.	Discharge Structure Remarks _____	G Functioning	G N/A
VIII. VERTICAL BARRIER WALLS		G Applicable	<u>G N/A</u>
1.	Settlement Areal extent _____ Remarks _____	G Location shown on site map	G Settlement not evident
2.	Performance Monitoring Type of monitoring _____ G Performance not monitored Frequency _____ Head differential _____ Remarks _____		G Evidence of breaching

IX. GROUNDWATER/SURFACE WATER REMEDIES		<input checked="" type="radio"/> Applicable	<input type="radio"/> N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines		<input checked="" type="radio"/> Applicable	<input type="radio"/> N/A
1.	Pumps, Wellhead Plumbing, and Electrical <input type="radio"/> Good condition <input type="radio"/> All required wells properly operating <input checked="" type="radio"/> Needs Maintenance <input type="radio"/> N/A Remarks <u>PW-2 IS IN PLACE BUT DUE TO VANDALISH NEEDS</u> <u>REPAIRS IN CASE IT NEEDS TO BE REACTIVATED</u>		
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="radio"/> Good condition <input type="radio"/> Needs Maintenance Remarks _____		
3.	Spare Parts and Equipment <input type="radio"/> Readily available <input type="radio"/> Good condition <input type="radio"/> Requires upgrade <input type="radio"/> Needs to be provided Remarks _____		
B. Surface Water Collection Structures, Pumps, and Pipelines		<input type="radio"/> Applicable	<input checked="" type="radio"/> N/A
1.	Collection Structures, Pumps, and Electrical <input type="radio"/> Good condition <input type="radio"/> Needs Maintenance Remarks _____		
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="radio"/> Good condition <input type="radio"/> Needs Maintenance Remarks _____		
3.	Spare Parts and Equipment <input type="radio"/> Readily available <input type="radio"/> Good condition <input type="radio"/> Requires upgrade <input type="radio"/> Needs to be provided Remarks _____		

C. Treatment System		G Applicable	<u>G N/A</u>
1.	Treatment Train (Check components that apply) G Metals removal G Oil/water separation G Bioremediation G Air stripping G Carbon adsorbers G Filters _____ G Additive (e.g., chelation agent, flocculent) _____ G Others _____ G Good condition G Needs Maintenance G Sampling ports properly marked and functional G Sampling/maintenance log displayed and up to date G Equipment properly identified G Quantity of groundwater treated annually _____ G Quantity of surface water treated annually _____ Remarks _____		
2.	Electrical Enclosures and Panels (properly rated and functional) G N/A G Good condition G Needs Maintenance Remarks _____		
3.	Tanks, Vaults, Storage Vessels G N/A G Good condition G Proper secondary containment G Needs Maintenance Remarks _____		
4.	Discharge Structure and Appurtenances G N/A G Good condition G Needs Maintenance Remarks _____		
5.	Treatment Building(s) G N/A G Good condition (esp. roof and doorways) G Needs repair G Chemicals and equipment properly stored Remarks _____		
6.	Monitoring Wells (pump and treatment remedy) G Properly secured/locked G Functioning G Routinely sampled G Good condition G All required wells located G Needs Maintenance G N/A Remarks _____		
D. Monitoring Data			
1.	Monitoring Data <u>G</u> Is routinely submitted on time <u>G</u> Is of acceptable quality		
2.	Monitoring data suggests: G Groundwater plume is effectively contained <u>G</u> Contaminant concentrations are declining SIGNIFICANTLY		

D. Monitored Natural Attenuation	
I. Monitoring Wells (natural attenuation remedy) <input checked="" type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____	
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). _____ THE REMEDY IS FUNCTIONING AS INTENDED _____ THE RESULTS SHOW DECLINING LEVELS OF _____ TCE GROUNDWATER CONTAMINATION - THIS DECLINE _____ IS CAUSED BY NATURAL ATTENUATION - _____ _____
B. Adequacy of O&M	N/A Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. _____ _____ _____ _____ _____ _____ _____ _____

C. Early Indicators of Potential Remedy Problems
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.
<div style="text-align: center;">N/A</div>
D. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
SOUTH BEND TOWNSHIP IS IN A PROCESS OF DEVELOPING A COMPREHENSIVE ORDINANCE WITH AIM OF PROTECTING THE PUBLIC AGAINST EXPOSURE TO THE SITE'S CONTAMINATED GROUNDWATER